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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BROCK II, PAUL E

ART UNIT PAPER NUMBER

2815

DATE MAILED: 06/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/532,892

Applicant(s)

SASAKI, MAKOTO

Examiner

Paul E Brock II

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 15-25 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 15-25 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “an end of said copper fuse section being connected to said first wiring line without an intervening film therebetween and another end of said copper said section being connected to said second wiring line without an intervening film therebetween,” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: There is no support in the specification for “an end of said copper fuse section being connected to said first wiring line without an intervening film therebetween and another end of said copper said section being connected to said second wiring line without an intervening film therebetween.”

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1 – 7 and 15 and 16 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. It is not clear where in the originally filed specification support for “an end of said copper fuse section being connected to said first wiring line without an intervening film therebetween and another end of said copper said section being connected to said second wiring line without an intervening film therebetween,” can be found.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what “wherein said cross section includes at least a portion of said cross section,” means. Why wouldn’t the cross section include a portion of the cross section?

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

8. Claims 1 – 6, 17 – 23 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Stamper (USPAT 6111301).

With regard to claim 1, Stamper discloses in figure 4 and column 3, lines 7 – 20 a semiconductor memory device, including a copper fuse section (2) that is oxidized by a laser beam in an oxidizing environment.. Stamper discloses in figure 4 and column 3, lines 7 – 20 a dielectric film (8), including a first film section (bottom 8), a second film section (bottom half of the middle 8 and the left and right 8's) formed on the first film section, and a third film section (top half of the middle 8) formed over the second film section. Stamper discloses in figure 4 and column 3, lines 7 – 20 a wiring line structure (6). Stamper discloses in figure 4 and column 3, lines 7 – 20 a first (left 3 and 6) and a second (right 3 and 6) wiring line, each of the first and second wiring lines formed directly upon the second film section of the dielectric film without an intervening film therebetween and extending in an opposite direction. Stamper discloses in figure 4 and column 3, lines 7 – 20 said copper fuse section formed on the first film section of the dielectric film, an end of the copper fuse section being connected to the first wiring line and

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another end of the copper fuse being connected to the second wiring line. Stamper discloses in figure 4, column 1 lines 29 – 37, and column 3, lines 7 – 20 an opening formed in the third and second film sections of the dielectric film and between the first and second wiring lines, wherein the opening provides access to the laser beam to oxidize the copper fuse section in the oxidizing environment.

With regard to claim 2, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film inherently has a thermal endurance of 350 °C or above. This is an inherent property of silicon dioxide.

With regard to claim 3, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film has a relative dielectric constant equal to or lower than 4. This is an inherent property of silicon dioxide.

With regard to claims 4 and 5, Stamper discloses in column 2, line 56 wherein at least one of the first and second wiring lines includes copper.

With regard to claim 6, Stamper discloses in figure 2 wherein the copper fuse section is connected to the first wiring line via a first conductive plug (9) and to the second wiring line via second conductive plug (9).

With regard to claim 17, Stamper discloses in figure 2 and column 1, lines 13 – 35 a semiconductor device including a copper fuse, the copper fuse being programmed to a high resistance state by oxidation, wherein the high resistance state results from a cross section of the copper fuse being oxidized to copper oxide.

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With regard to claim 18, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film inherently has a thermal endurance of 350 °C or greater. This is an inherent property of silicon dioxide.

With regard to claim 19, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film has a relative dielectric constant equal to or lower than 4. This is an inherent property of silicon dioxide.

With regard to claim 20, Stamper discloses in figure 4 a dielectric film including a first film section formed over a substrate, a second film section formed on the first film section, and a third film section formed on the second film section. Stamper discloses in figure 4 a first wiring line and a second wiring line, each of the first wiring line and the second wiring line being formed on the second film section of the dielectric film. Stamper discloses in figure 4 and column 1, lines 13 – 35 the copper fuse formed on the first film section of the dielectric film, an end of the copper fuse being connected to the first wiring line and another end of the copper fuse being connected to the second wiring line, and the copper fuse being programmed to a high resistance state by oxidation. Stamper discloses in figure 4 and column 1, lines 13 – 35 an opening formed in the third and second film sections of the dielectric film and between the first wiring line and the second wiring line. Stamper discloses in figure 4 and column 1, lines 13 – 35 wherein the high resistance state results from a cross section of the copper fuse being oxidized to copper oxide and the cross section is located in the opening.

With regard to claim 21, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film inherently has a thermal endurance of 350 °C or greater. This is an inherent property of silicon dioxide.

With regard to claim 22, Stamper discloses in column 2, lines 60 – 61 wherein the dielectric film has a relative dielectric constant equal to or lower than 4. This is an inherent property of silicon dioxide.

With regard to claim 23, Stamper discloses in column 2, line 56 wherein at least one of the first and second wiring lines includes copper.

With regard to claim 25, Stamper discloses in figure 4 and column 1, lines 13 – 35 wherein the cross section includes at least a portion of the cross section.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 7, 15 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stamper as applied to claim 1 and 20 above, and further in view of Huang et al. (USPAT 6162686, Huang).

Stamper is silent on a third wiring line formed of copper on the first dielectric film. Huang teaches in figure 5 and column 6, lines 20 – 22 a semiconductor memory device that comprises a wiring line (44(M2)) formed on a first section of a first dielectric film (30). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the

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wiring line of Huang in the device of Stamper in order to connect devices together as stated by Huang in column 4, lines 25 – 35.

With regard to claim 15, Huang teaches in figure 5 and column 6, lines 20 – 22 wherein the wiring line includes copper.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stamper and Huang as applied to claims 1 and 7 above, and further in view of Shih et al. (USPAT 6100118, Shih).

With regard to claim 16, Stamper and Huang are silent to the teaching that the wiring line is disposed parallel to a wiring line structure. Shih teaches in figure 3 wherein a wiring line (42) is disposed parallel to a wiring line structure (31a and 31b). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the parallel lines of Shih in the device of Stamper and Huang in order to have extensive interconnections on each wiring layer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II
June 4, 2002



EDDIE LEE
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